Osicom

ROUTERmate™

T-1 CSU/DSU

INSTALLATION AND OPERATION MANUAL

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NOTICE

Osicom Technologies may incorporate enhancements in the product and change the product specifications described in this manual at any time and without notice.

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NOTE: This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules. These rules are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference, in which case the user is required to correct the interference at his own expense.

This equipment also meets the technical criteria in the part 68 rules, Subparts A through F (for connection of terminal equipment to the telephone network).

FCC REGISTRATION NUMBER:	1R5USA-23055-DE-N
FCC FACILITY INTERFACE CODES:	
04DU9–BN:	1.544 Mbps SuperFrame format without line power
04DU9–DN:	1.544 Mbps SF and B8ZS without line power
04DU9–1KN:	1.544 Mbps ANSI ESF without line power
04DU9–1SN:	1.544 Mbps ANSI ESF and B8ZS without line power
SERVICE CODE:	6.0N
JACK ARRANGEMENTS:	RJ48C 8-pin modular telephone jack to connect to the network

Osicom Technologies wall-mount transformer (550-0366-01) must be used with the Routermate to assure reliability and compliance with FCC and Underwriters Laboratories requirements.

Canadian Department of Communications Notice

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Industry Canada's Compliance Notice

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le material du Canada.

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INTRODUCTION 1

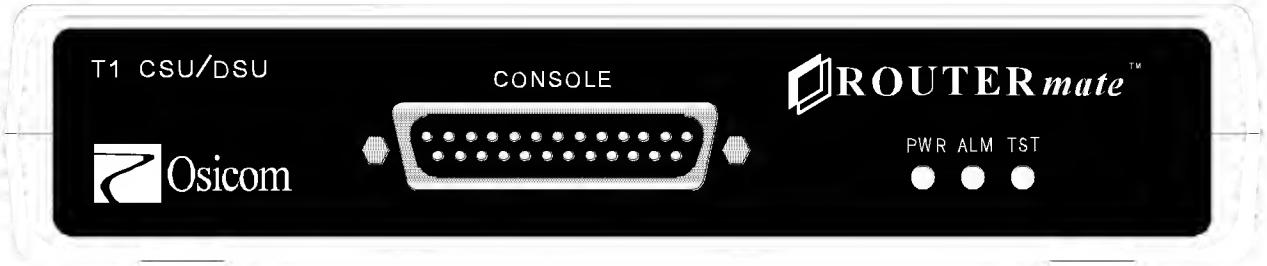

Figure 1-1. Routermate T-1 CSU/DSU

The ROUTER*mate*™ T-1 CSU/DSU provides the interface between customer equipment and a full or fractional T-1 facility. The Routermate also provides features that take full advantage of DACS (Digital Access Cross-connect Services) networks.

The synchronous channel includes a Data Service Unit (DSU) and operates at multiples of 56 or 64 Kbps up to 1.536 Mbps.

Ordering information and part numbers for all versions of the Routermate are listed in Table B-1.

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1.1 System Features

T-1 Routermate system features include:

Management

The Routermate can be managed by a variety of methods.

SNMP - An embedded Simple Network Management Protocol (SNMP) agent resides in the T-1 CSU/DSU. Osicom supplies an enterprise Management Information Base (MIB) that provides full configuration and diagnostic control.

Management Screens - A series of password-protected management screens can be accessed from an ASCII terminal or by a Telnet connection.

SLIP Management - The Routermate implements Serial Line Internet Protocol (SLIP), which enables SNMP and Telnet management. Telnet management involves making a Telnet connection to the Routermate's SLIP interface to access the management screens.

One Telnet connection is allowed at a time; however, Telnet and SNMP management can be performed at the same time.

ESF Operation

The Routermate features Extended SuperFrame (ESF) operation. ESF provides a 4 Kbps data link channel transparent to user data. With ESF, the Telco central office can continuously monitor the local loop, transmit and receive test messages and retrieve performance statistics. The Routermate is fully compliant with both ANSI T1.403 and AT&T 54016 ESF messaging specifications.

Protection for the Network

The Routermate provides complete protection for the network. When ANSI 62411 coding is selected, it automatically inserts pulses into the transmitted signal as required to meet bit density specifications as defined in AT&T's Technical Publication 62411. For applications that do not meet bit density requirements, you can select inverted data.

Diagnostics

The Routermate continuously monitors the performance of the T-1 link. Errors are reported in separate user and carrier registers. The carrier registers are under control of the telco central office. The user registers cannot be reset by the central office and may be used to provide an audit of T-1 link performance.

Built-in Bit Error Rate Tester

The Routermate includes a built-in bit error rate tester (BERT), eliminating the need for external test equipment. The built-in tester can transmit any one of three test patterns: Framed QRSS, Framed Ones or Minimum Density. You can insert bit errors in all patterns. The Routermate records seconds in test, seconds in error, and last reset time.

Data Rate

The synchronous channel delivers 24 speeds at multiples of 56 Kbps and 24 speeds at multiples of 64 Kbps (up to 1.536 Mbps). Selecting a multiple of 56 Kbps positions user data in seven of the eight bits of every configured DS0. The eighth bit is forced to a one in each configured DS0. This guarantees that the resulting data stream meets ones' density for the T-1 link.

Selecting a speed that is a multiple of 64 Kbps positions user data in all eight bits of all configured DS0s. This does not, however, guarantee ones' density on the T-1 link. As each speed is displayed on the menu, the screen shows the speed, if it is a multiple of 56 or 64 Kbps, and the total number of DS0s required to support that speed. Fractional T-1 installations use this information to show what part of the T-1 link contains the user's data.

Clear Channel Operation

The Routermate uses B8ZS (Bipolar Eight Zero Substitution) for clear channel operation. Clear channel operation may be required in applications where the user data is formatted in contiguous N x 64K multiples and where the protocol does not guarantee minimum ones density (where less than 12.5% of transmitted data contains a binary one state).

1.2 Functional Description

The primary function of a CSU/DSU is to provide isolation between the user's premise equipment and the carrier's T-1 transmission facilities. It also protects the customer equipment from hazardous line voltages or other potentially destructive signals (e.g., lightning) that could be carried into the facility.

The Routermate provides more functions than just isolation and protection. Situated between the customer equipment and the carrier facilities, the Routermate:

- Regenerates incoming signals weakened or distorted by the transmission facility
- Diagnoses/isolates faults
- Isolates and prevents the customer equipment or facility from degrading the performance of the carrier network.

The Routermate provides alarms and error statistics, including Red, Blue, and Yellow alarms.

1.3 Application

Figure 1-2 illustrates the Routermate in a typical application. The Routermate can be accessed from anywhere on the network by an SNMP management station or any device using Telnet protocol. The user can view management screens and initiate diagnostics.

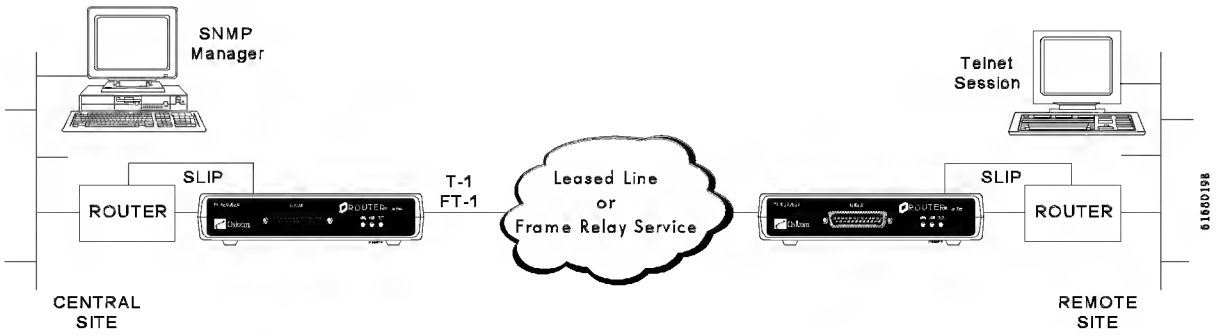

Figure 1-2. Routermate Application

INSTALLATION 2

This chapter describes the interface connectors and the installation of cables required to support applications for the T-1 Routermate, including terminal, SNMP, and Telnet management.

See Chapter 3, *Terminal Operation* for terminal screens and descriptions of the options and parameters.

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2.1 Unpacking

All equipment is normally shipped in cardboard cartons with foam inserts to protect the units from shock and vibration experienced during shipment. Upon arrival of the equipment, inspect the condition of the received cartons and compare all items to the packing list attached to the carton.

The following items are included with the unit:

- wall-mount transformer
- NI cable

Obtain the console and SLIP cables from your terminal and router vendor. See *Installation Checklist* on page 2-2.

Notify both Osicom Technologies' Customer Service Department (1-800-359-2273) and the transportation carrier *immediately* if there are any damages or shortages.

Save the cartons and foam inserts in case the unit must be shipped at a later date.

2.2 Installation Checklist

1. Prepare the site, including provision of a grounded power outlet.
2. Verify that common carrier or customer-supplied line is installed.
3. Obtain the console/SLIP management cables from your terminal vendor and router (or terminal server) supplier.

- The console cable should be a straight-through cable with a DB25-male connector at the Routermate (DCE) end and a connector that matches the terminal interface at the terminal (DTE) end.
- If your router's SLIP cable is designed to attach to a terminal, configure the Routermate's SLIP interface as a DTE (default setting).
- If your router's SLIP cable is designed to attach to a modem, configure the Routermate's SLIP interface as a DCE.

See *SLIP Management* on page 2-6 for information on configuring the SLIP interface.

See Appendix A for interface connector signals. Cables supplied by Osicom are listed in Appendix B.

4. Attach an ASCII terminal (see Terminal Management on page 2-5) and enter the configuration data for the NI, DTE, and SLIP interfaces.

- Parameters for the NI connector are on the System Configuration Menu, page 3-7.
- Parameters for the DTE interfaces are on the Channel Configuration Menu, page 3-9.
- Parameters for the SLIP interface are on the Management Menu, page 3-24.

2.2.1 Communications Line Requirements for CSU/DSU

The communications facility between Routermates should be a full or fractional T-1 line. When used in LDM (Limited Distance Modem) mode, the communications facility should be a metallic baseband line with a wire gauge between 19 and 26 (inclusive). The T-1 Routermate will not operate on Dial Network (DDD) lines nor on voice-grade lines.

The baseband line must have the following characteristics:

- Metallic continuity
- Non-switched
- Two shielded twisted pairs
- Must not be equipped with correcting circuits, repeaters, or loading coils

We recommend that you use two separate twisted-pair cables. In noisy environments, use shielded twin cables that are grounded to your telecommunications facility.

2.3 FCC Part 68 Requirements for CSU/DSU

Notification to the Telephone Company

The Routermate complies with Part 68 of FCC Rules. You must provide the 14-character FCC Registration Number (see multipurpose label on underside of unit), plus the Facility Interface Codes (according to data transmission speed) and Service Order Code (see front matter of manual) to your telephone company so they can connect the necessary service.

Malfunction of the Equipment

In the event this equipment should fail to operate properly, disconnect the unit from the communications line until you learn whether the source of trouble is in your equipment or in the line. If the trouble appears to be with this unit, discontinue use of the unit until it is repaired.

Under FCC rules, no customer is authorized to repair this equipment. This restriction applies whether the equipment is in or out of warranty.

Please note that the telephone company may ask that you disconnect this equipment from their lines until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

Incidence of Harm

If your equipment causes harm to the network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible.

Rights of the Telephone Company

Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted service.

Industry Canada's Compliance Notice

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le material du Canada.

2.4 LED Indicators

LED indicators on the front panel provide you with a continuous status report of the unit.

PWR	A green LED that indicates power in on when lit.
ALM	A red alarm LED that lights to indicate that an alarm condition has occurred.
TST	A red test LED lights to indicate that a diagnostic test is active. It flashes to indicate a channel test and lights steady to indicate a system test.

2.5 Interfaces

Figure 2-1 shows the rear panel connectors.

- POWER - wall-mount transformer included
- NI (Network Interface) - RJ48C, 8-position modular jack; keyed
- DTE - V.35 (34-pin female)
- SLIP - RS-232 (25-pin female)
- CONSOLE - RS-232 (25-pin female)

Appendix A provides interface pin descriptions and cable illustrations. Appendix B lists order numbers for cables.

2.5.1 Power

The Routermate includes a 9 VAC, 1.0 amp wall-mount transformer. Refer to Appendix C, Specifications, for power requirements.

To avoid possible errors due to potential difference between grounds for the CSU/DSU and for the DTE, the power receptacle for the CSU/DSU and DTE should be served from the same AC distribution panel or dedicated outlet.

> ***NOTE***
> Use only the wall-mount transformer included with the unit. See the Multipurpose Label on the underside of the unit for the part number.

2.5.2 Network Interface

The Network Interface (NI) connects the Routermate to the carrier facility. The NI connector is an 8-pin keyed modular jack and accommodates D4- or ESF-framed formats; or fractional T-1 input using from 1 to 24 DS0s (64 Kbps time slots).

Use shielded cable DCA94511, included with the unit, to connect the NI jack to the RJ48C telco jack.

Configure the NI interface to match the type of service supplied by the carrier. See the System Configuration menu on page 3-7.

2.5.3 DTE Interface

One V.35 DTE connector is provided. Use the appropriate cable to connect the Routermate to your DTE. See Appendix A for interface pin assignments.

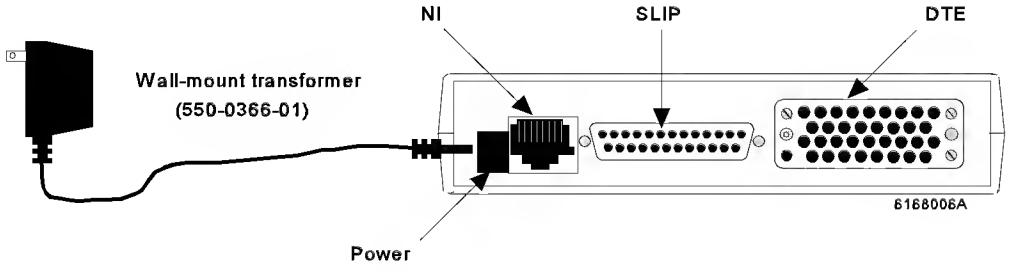


Figure 2-1. Rear Panel Connectors

2.6 Terminal Management

The Routermate management screens can be accessed from a terminal. Connect the terminal to the **CONSOLE** interface (Figure 2-2).

To access the management screens:

1. Connect a straight-through cable from the CONSOLE interface on the front panel to an ASCII terminal. The cable should be a straight-through cable with a DB25-male connector at the Routermate (DCE) end and a connector that matches the terminal interface at the terminal (DTE) end.
2. Turn on the ASCII terminal and set the terminal transmission options:

- Rate: 9600 bps
- Mode: full duplex
- Character: 8 bits
- Parity: none
- Stop bits: 1
- Flow control: DC1/DC3 (Xon/Xoff)

The Routermate's CONSOLE interface is fixed at 9600 bps, 8 character bits, 1 stop bit, and no parity.

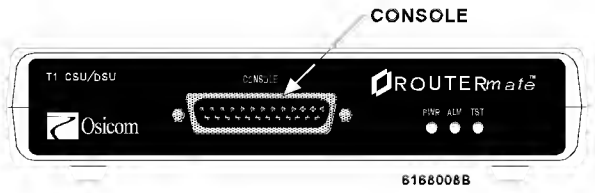


Figure 2-2. Console Interface

2.7 SLIP Management

The Routermate implements Serial Line Internet Protocol (SLIP), which enables SNMP and Telnet Management over a standard RS-232 interface. SNMP traffic and traffic from a single Telnet connection can pass simultaneously.

2.7.1 SNMP/Telnet Installation

If SNMP or Telnet are used to manage the Routermate, perform the following steps:

1. Configure jumpers. Three jumpers (E1, E2, E3) determine if the SLIP port is configured as a DTE or DCE (Figure 2-3). These jumpers are pre-set to configure the SLIP port as a DTE (connects to a DCE).

   For either the DTE or DCE setting, all three jumpers are set to the same position.

- Jumper 1-2 = DCE; the SLIP port will be connected to a DTE.
- Jumper 2-3 = DTE; (default); the SLIP port will be connected to a DCE.

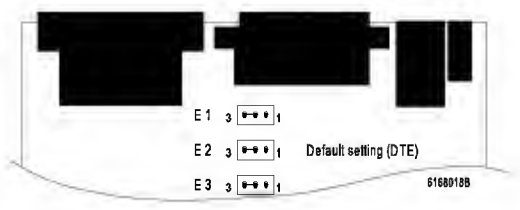


Figure 2-3. Configuring the SLIP Port for DTE or DCE Operation

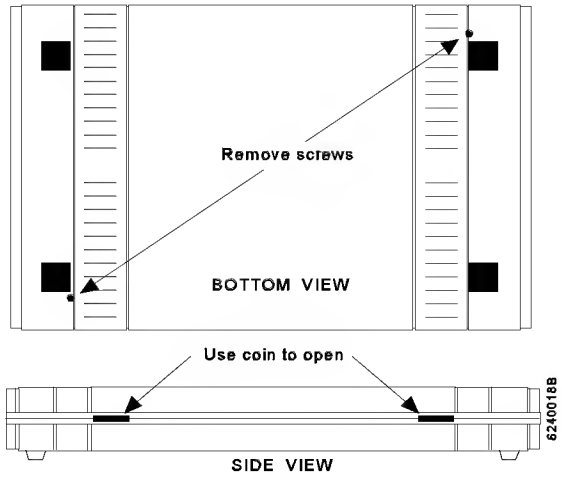
WARNING!
Disconnect power before opening the enclosure.

To access the jumpers:

Remove the two screws on the bottom of the unit.

Gently pry open the enclosure (a coin will work).

NOTE
When re-assembling the enclosure, be careful not to over-tighten the screws.



2. Connect SLIP cable. Connect a cable from the SLIP interface to an auxiliary asynchronous interface of a router or terminal server. Ensure that the auxiliary asynchronous port on the router or terminal server is set to 9600 bps, 8+1, and no parity. This is the fixed configuration of the Routermate's SLIP interface.

3. Configure SNMP and Telnet management parameters. Using an ASCII terminal, access the Management Menu (see Chapter 3 for terminal screens).

- For both Telnet and SNMP applications, assign an IP address to the Routermate.
- Before Telnet management can be used, set the Access via telnet parameter to Enabled.
- Before SNMP management can be used, configure the SNMP R/O Community, and SNMP R/W Community strings to match the strings used by the SNMP management station.

Figure 2-4 shows the cables and adapters required to connect a Routermate T-1 to the AUX port of a Cisco™ router. Order numbers for cables and adapters available from Osicom are in Appendix B.

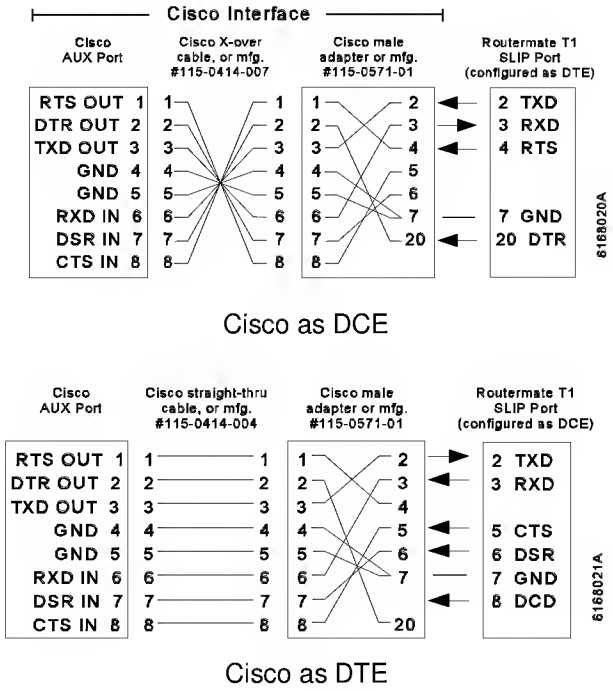


Figure 2-4. SLIP Connection to Cisco Router

2.8 Obtaining the Enterprise MIB

In SNMP applications, Osicom's enterprise MIB lets you take full advantage of the Routermate's management features from an SNMP workstation.

The enterprise MIB can be downloaded from Osicom's Web site at: *www.osicom.com*

TERMINAL OPERATION 3

This chapter illustrates the terminal screens and explains how to use the menus to configure and manage the Routermate T-1, including the parameter options and descriptions.

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3.1 Screen Structure

Figure 3-1 illustrates the screen structure for the terminal management screens.

Brief descriptions of the menus are provided below.

Main Menu – top level menu from which all subsequent menus are selected.

System Configuration – configure parameters for the network interface.

Channel Configuration – configure parameters for the synchronous channel.

Bandwidth Allocation – assign DS0s to the synchronous channel.

System Diagnostics – initiate and monitor loopback tests and monitor alarm conditions for the network interface.

Channel Diagnostics – initiate and monitor loopback tests and monitor alarm conditions for the synchronous channel interface.

User Registers – view the status of the ESF link over a 24-hour period in 15 minute intervals. Use this menu to pinpoint exactly when errors occurred. You can reset this register at any time.

Carrier Registers – view the status of the ESF link over a 24-hour period in 15 minute intervals. This is the information the Telephone Company would see if requested.

Unit – configure the following supervisory functions:

- Header lines on the terminal screens
- Inactivity timeout
- Passwords

Also access the System Restart and Service Information screens.

Management – configure parameters for SNMP and Telnet management.

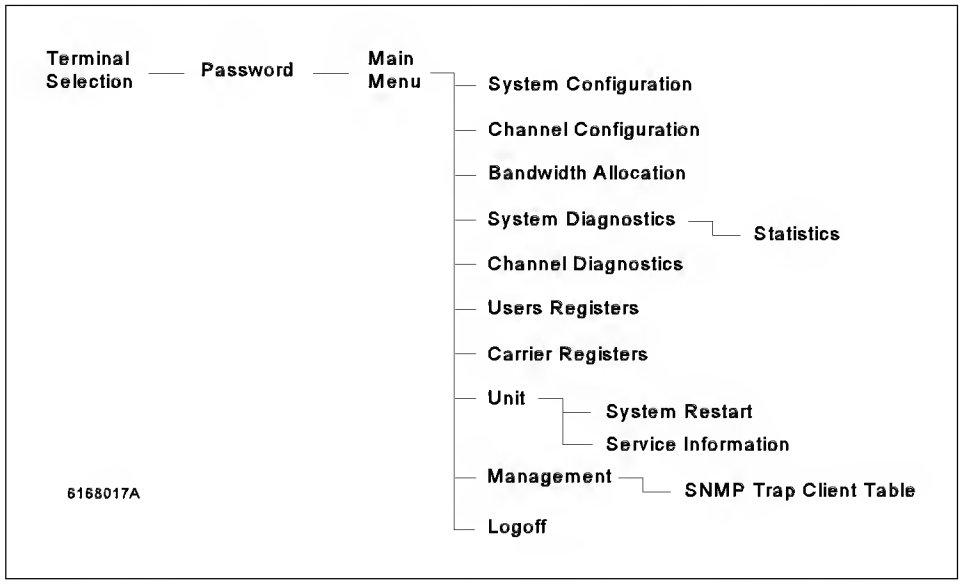


Figure 3-1. Screen Structure

3.2 Keys and Conventions

Prompts at the bottom of each screen instruct the user which keys to use to:

- Position the cursor
- Edit parameters
- Execute commands
- Access other screens

Table 3-1 summarizes the most frequently used keys.

Edit Fields

To configure a parameter by typing a value:

- Press **[CR]** to highlight the field.
- Type the value.
- Press **[CR]** again to exit the field.

To restore the parameter to its original contents, press **[Esc]** before exiting the field.

To edit existing text in a field that can be edited:

- Move the cursor to the field and press **[Ctrl-E]** to highlight the field.
- Use the arrow keys to move the cursor within the field.
- Type over the existing information.
- Press **[CR]** to exit the field.

To delete existing text from a field that can be edited:

- Move the cursor to the field and press **[CR]**.
- Press **[Space Bar]**.
- Press **[CR]** again.

Selecting from multiple options

- Move the cursor to the parameter.
- Press **[CR]** to toggle/scroll through the available options.
- When the desired option is displayed, either move the cursor to the next parameter using **[Space Bar]** or **[Backspace]**, or exit the screen.

To restore the parameter to its original contents, press **[Esc]** before exiting the field.

Saving Changes

Press **[X]** to exit from a screen. If you have modified any parameter, you are prompted:

```
Confirm this configuration?
No  Yes
```

Select *No* to exit the current screen without saving the changes; select *Yes* to save the changes and exit.

Table 3-1. Frequently Used Keys

KEY	FUNCTION
Move Around in Screens	
[Space Bar]	cursor down
[Back Space]	cursor up
[Ctrl-N]	Terminal Selection screen
[Ctrl-O]	re-draw screen
[Ctrl-T]	return to Main Menu *
[X]	exit to previous screen
Type an Entry	
[CR]	select field
[Back Space]	delete character left
[Esc]	restore original setting
[Ctrl-E]	highlight field, edit text
[CR][Space Bar][CR]	delete current contents
Select From List	
[CR]	scroll/toggle through list
[Esc]	restore edited field to its original setting
[Space Bar]	move to next field

* **[Ctrl-T]** returns to the Main Menu without prompting to confirm configuration changes.

Certain prompts will change to correspond to the function or operation. An example is shown below.

FUNCTION/OPERATION	PROMPT
Edit an entry	Edit Field = [CR]
Select from multiple options	Scroll Through Options = [CR]
Select another menu	Select Menu = [CR]

3.3 Terminal Selection

Before configuring the unit, connect a terminal to the front-panel interface labeled **CONSOLE**, as described in Chapter 2.

Configure the terminal for:

- Rate: 9600 bps
- Mode: full duplex
- Character: 8 bits
- Parity: none
- Stop bits: 1
- Flow control: DC1/DC3 (Xon/Xoff)

The configuration of the **CONSOLE** port is fixed at 9600 bps, 8 character bits, 1 stop bit, and no parity.

When the unit is turned on, there is a brief delay as internal diagnostics run automatically. Then the Terminal Selection screen appears (Figure 3-2).

If the Terminal Selection screen does not appear, press **[Ctrl-N]**.

Type the letter for the type of terminal that is connected to the unit:

(A) ANSI 3.64
(B) DEC VT100
(C) PC ANSI
(D) IBM 3101
(E) DEC VT52
(F) Televideo 910

If the terminal displays garbled characters after the terminal type is selected, press **[CTRL-N]** to return to the Terminal Selection screen, where you can select a different terminal type.

Telnet: When a Telnet connection is used to access the management screens, the terminal type usually can be determined automatically. If not, the Terminal Selection screen is displayed. The user has three attempts or 30 seconds to enter the password before the session is disconnected.

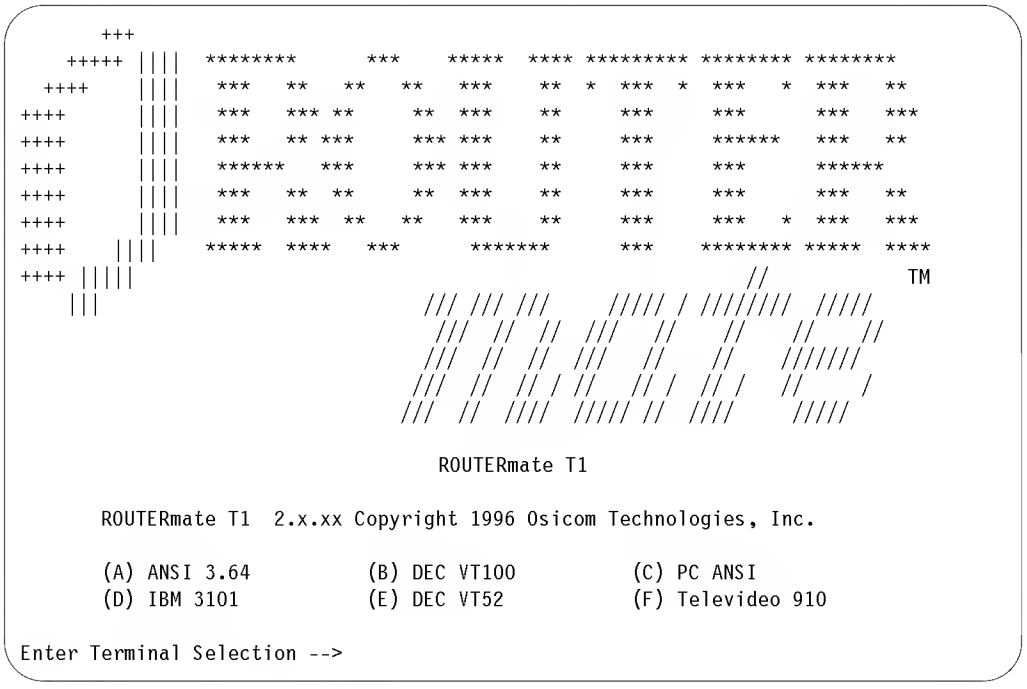


Figure 3-2. Terminal Selection Screen

3.4 Password

The management screens are password protected. A password prompt appears after a terminal type is selected (Figure 3-3).

To access the Main Menu, type the password and press **[CR]**.

If no password has been configured, simply press **[CR]**; this is the default password.

The password is configured at the Unit configuration screen.

Telnet: The Telnet user has thirty seconds from the time the Telnet session is connected to enter the password, or the session is disconnected.

Screen Path

Terminal Selection

▼

Password

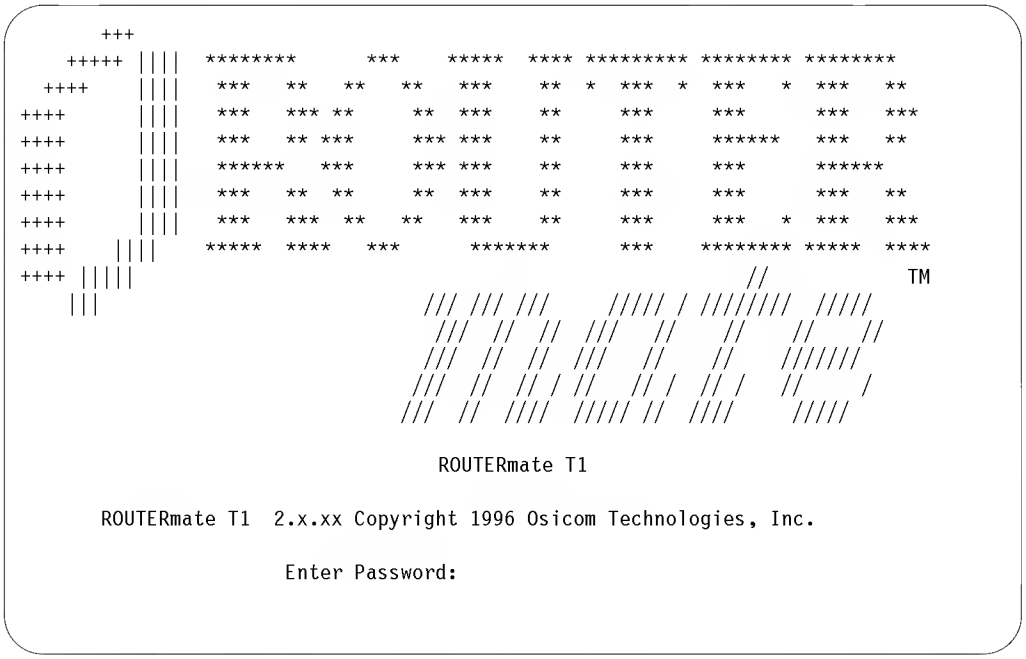


Figure 3-3. Password Screen

3.5 Main Menu

The Main Menu (Figure 3-4) is displayed after the password is entered.

To make a selection from the Main Menu, press **[Space Bar]** or **[Back Space]** to move the cursor to the desired selection; then press **[CR]**.

Logoff

When you select **Logoff** from the Main Menu, the Terminal Selection screen is displayed.

To select **Logoff**, position the cursor on **Logoff** and press **[CR]**.

To access the management screens after logging off, select a terminal type and then enter the password. The default password is **[CR]**.

Telnet: Selecting Logoff disconnects the Telnet connection.

3.5.1 Screen Path

To help the user navigate through the menus and screens, a **Screen Path** is illustrated next to each screen. Screen names are inside boxes. Commands and on-screen selections that lead to a screen are written in *italics*.

In the example below: at the Terminal Selection screen, enter the terminal selection [A - F] to display the Password screen. Enter the password to display the Main Menu.

> **NOTE**
> All terminal screens reflect default parameters.

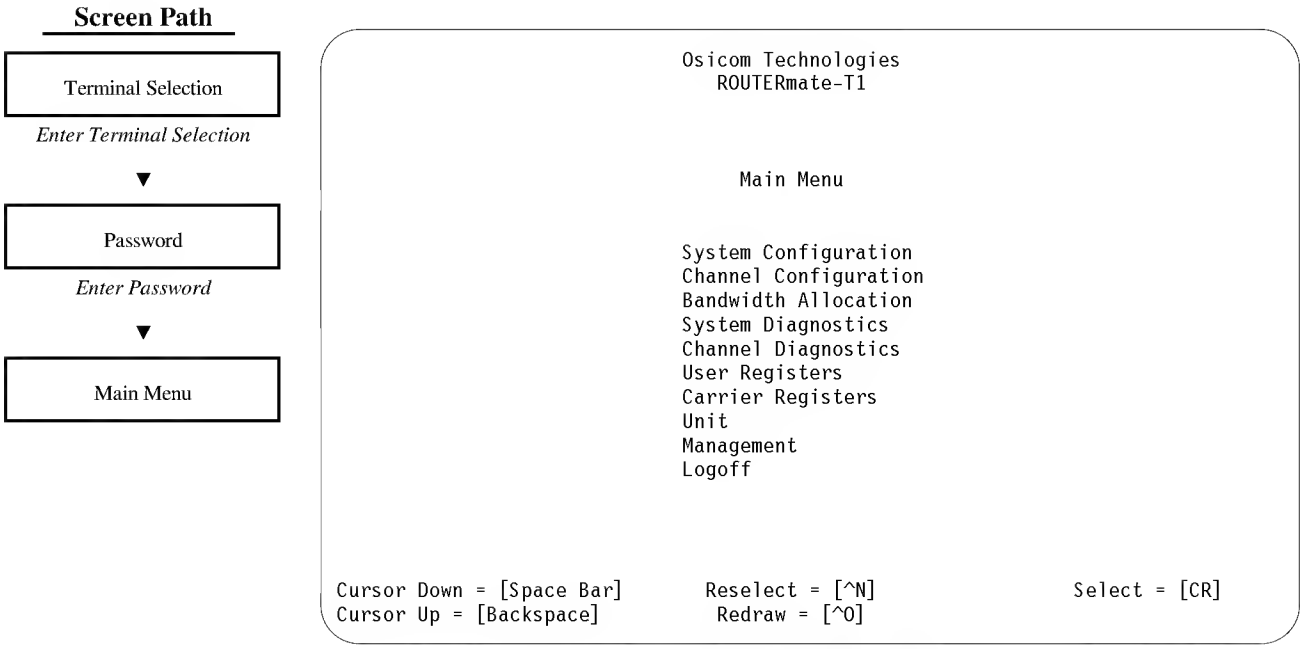


Figure 3-4. Main Menu

3.6 System Configuration Menu

The System Configuration menu (Figure 3-5) allows you to program and display the parameters for network interface.

To program the parameters on the System Configuration menu, follow the key prompts at the bottom of the screen.

1. Position the cursor on the desired parameter.
2. Press **[CR]** to scroll through the available options.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
 No  Yes
```

The default is *No*. Press **[CR]** or **N** if you do not want to save your changes.

If you do want to save the changes, press **Y**.

NI Format - set the frame format for the network interface.

D4 - AT&T D4 Superframe standard, in which 12 T-1 frames make up a superframe.

ESF - AT&T TR 54016 **E**xtended **S**uper**F**rame standard, in which 24 T-1 frames make up an extended superframe.

Auto Detect - automatically detects the type of framing on the line, so when the Routermate is installed, the frame format is configured automatically. This option resets upon:

- power-up
- transition from loss of signal to no loss of signal
- when user selects this option and saves configuration

The frame format detected is displayed in parentheses next to the Auto Detect option.

Screen Path

Main Menu

System Configuration

▼

System Configuration

```
                Osicom Technologies
                   ROUTERmate-T1

                System Configuration

          NI Format:            Auto Detect (ESF)
          NI Coding:            Auto Detect (AMI)
          Timing:               Repeater (NI)
          Line Build Out:       0 dB/0-133ft
          ESF Data Link:        AT&T TR-54016
          ESF Carrier Loops:    Enabled
          Remote Inband Loops:  Enabled


Cursor Down = [Space Bar]                  Select = [CR]
Cursor Up = [Backspace]                       Exit = [X]
```

Figure 3-5. System Configuration Screen

NI Coding - select the line coding mode and density for the network interface output.

AMI - 62411 - Alternate Mark Inversion; this mode assures that the transmitted data meets bit density requirements specified in AT&T Technical Publication 62411.

Auto Detect - automatically detects the type of coding on the line, so when the Routermate is installed, the NI coding is configured automatically. This option resets upon:

- power-up
- transition from loss of signal to no loss of signal
- when user selects this option and saves configuration

The coding detected is displayed in parentheses next to the Auto Detect option. Auto Detect is the default. B8ZS will not be displayed until the B8ZS encoding pattern is received from the network.

B8ZS - Bipolar 8 Zero Substitution; this mode formats the data in such a way that it avoids bit density errors. In B8ZS mode, any data pattern (including an indefinite period of zeroes) can be transmitted without causing bit density errors; this is known as Clear Channel operation.

AMI - No Density - this mode will not enforce bit density requirements specified in AT&T Technical Publication 62411. This mode is provided for test purposes where disabling density requirements is desired.

Timing - set the timing for the DS1 input.

Internal - free-running

Repeater (NI) - always locked to the NI side

External To Chnl 1 - takes the clock from the channel's external TX clock. When this timing option is selected, the user should also set the associated channel's clocking parameter to INT RXC-EXT TXC.

> ***NOTE***
>
> If this clock stops, the unit does not freerun. The NI will go into an alarm condition until the clock recovers or the setting is manually changed.

Line Build Out (LBO) - select the pulse shape and attenuation of the signal sent to the network.

0-133ft/0db
133-266ft
266-399ft
399-533ft
533-655ft
7.5 db
15 db
22.5 db

ESF Data Link - ESF operation provides a 4 Kbps data link channel transparent to user data. With ESF, the Telco Central Office can continuously monitor local loops, transmit and receive test messages, and retrieve performance statistics.

This parameter determines which variant of the data link protocol will be used. Select the protocol that matches the one used by the carrier. Contact your carrier to determine which protocol they are using. Select:

AT&T TR-54016
ANSI T1.403

ESF Carrier Loops - enables the carrier to place the Routermate T-1 in either Line or Payload Loop via ESF data link messages from their management system.

Enabled - the Routermate T-1 will respond to ESF loop commands from the network provider.

Disabled - the Routermate T-1 will ignore ESF loop commands from the network provider.

Remote Inband Loops - enables the local Routermate T-1 to transmit and to respond to Line Loop Up or Line Loop Down commands.

The Telephone Company and a remote CSU can send a bit pattern causing the Routermate to go into a Line Loop. Select:

Enabled - local Routermate T-1 will transmit and respond to these commands from the network.

Disabled - local Routermate T-1 will not transmit or respond to these commands from the network.

When set to *Disabled*, the Remote NI Loop command at the System Diagnostics screen cannot be selected.

3.7 Channel Configuration Menu

The Channel Configuration menu (Figure 3-6) lets you program the parameters for the synchronous channel.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
 No  Yes
```

The default is *No*. Press **[CR]** or **N** if you do not want to save your changes. If you do want to save the changes, press **Y**.

State - determines if data is passed to DS0s assigned to the channel.

In Service - data is passed between the synchronous channel and the DS0s assigned to the channel.

Out of Service - data is not passed between the synchronous channel and the DS0s assigned to the channel. The received data lead of the synchronous channel is clamped to the mark state and all ones are sent to the network for any DS0s assigned to the synchronous channel.

Screen Path

Main Menu

Channel Configuration

▼

Channel Configuration

```
                    Osicom Technologies
                       ROUTERmate-T1


                  Channel Configuration

                                Channel 1

          State:                In Service
          Data Rate:            1344K (56K X 24)
          Data Mode:            Normal
          Clocking:             Int Rxc - Int Txc
          Clocking Mode:        Normal
          Remote Loop:          Enabled
          DSR:                  Follow DTR
          CTS:                  Follow RTS
          LSD:                  On



Cursor Down = [Space Bar]                          Select = [CR]
Cursor Up = [Backspace]                               Exit = [X]
```

Figure 3-6. Channel Configuration Menu

Data Rate - select the speed at which the synchronous channel will be running. The screen shows the speed, if it is a multiple of 56 or 64 Kbps, and the total number of DS0s required to support that speed. You must also configure the number of DS0s required in the Bandwidth Allocation screen (see Section 3.8).

Selecting a multiple of 56 Kbps positions user data in the first seven bits of every configured DS0. The eighth bit is forced to a one. This guarantees that the resulting data stream meets ones density requirements.

Selecting a multiple of 64 Kbps positions user data in all eight bits of every configured DS0. This does not guarantee that the resulting data stream meets ones density requirements.

The available speeds in multiples of 56 kbps are:

56k (56k x 01)	*504k (56k x 09)*	*952k (56k x 17)*
112k (56k x 02)	*560k (56k x 10)*	*1008k (56k x 18)*
168k (56k x 03)	*616k (56k x 11)*	*1064k (56k x 19)*
224k (56k x 04)	*672k (56k x 12)*	*1120k (56k x 20)*
280k (56k x 05)	*728k (56k x 13)*	*1176k (56k x 21)*
336k (56k x 06)	*784k (56k x 14)*	*1232k (56k x 22)*
392k (56k x 07)	*840k (56k x 15)*	*1288k (56k x 23)*
448k (56k x 08)	*896k (56k x 16)*	*1344k (56k x 24)*

The available speeds in multiples of 64 kbps are:

64k (64k x 01)	*576k (64k x 09)*	*1088k (64k x 17)*
128k (64k x 02)	*640k (64k x 10)*	*1152k (64k x 18)*
192k (64k x 03)	*704k (64k x 11)*	*1216k (64k x 19)*
256k (64k x 04)	*768k (64k x 12)*	*1280k (64k x 20)*
320k (64k x 05)	*832k (64k x 13)*	*1344k (64k x 21)*
384k (64k x 06)	*896k (64k x 14)*	*1408k (64k x 22)*
448k (64k x 07)	*960k (64k x 15)*	*1472k (64k x 23)*
512k (64k x 08)	*1024k (64k x 16)*	*1536k (64k x 24)*

Setting the data rate to *Not Used* prevents the Bandwidth Allocation screen from indicating a bandwidth error when no DS0s are assigned to the channel.

Data Mode - when there are large numbers of zeros in the data stream, inverting the data may help meet the one's density requirement. The Data Mode parameter must be set the same at both ends of the network.

Normal - data is not inverted.

Inverted - data is inverted. Inverted data can only be used in transparent networks, which do not interpret user data. Inverted data cannot be used on frame relay networks or any other network that interprets user data.

Long strings of zeros occurring in HDLC protocols can violate one's density. Zero insertion, a characteristic of HDLC protocols, prevents long strings of ones from occurring by inserting a zero after a string of five contiguous ones within a frame. Therefore, selecting Inverted should allow HDLC protocols to run at n x 64 channel speeds without density errors when AMI line coding is used.

Clocking - determines the timing used by the synchronous channel. The options are:

Int Rxc-Int Txc (Give RXC/Give TXC) - the channel gives both a transmit clock and receive clock to the DTE. The DTE (customer's equipment) uses the channel's transmit and receive clock for data transmission and reception.

Int Rxc-Ext Txc (Give RXC/Get TXC) - the channel gives the receive clock to the DTE and gets the transmit clock from the DTE. This setting is used for tail circuit and some excess cable length applications.

When you select *Int Rxc-Ext Txc*, also select *Ext to Chnl 1* for the NI Timing (see System Configuration), otherwise errors may occur due to clock slips caused by having two clock sources.

Clocking Mode - using a long cable on the synchronous channel may introduce delays which cause transmit data to get out of phase with transmit clock. Selecting *Inverted* will place transmit clock 180° out of phase with receive clock; this may prevent these errors.

Normal - Tx clock is not inverted.
Inverted - Tx clock is inverted.

Remote Loop - determines channel's response to V.54 loop commands.

Enabled - channel will respond to V.54 loop commands from the remote synchronous channel.

Disabled - channel will not respond to loop commands from the remote synchronous channels.

DSR *Follow DTR* - Data Set Ready follows Data Terminal Ready.

On - Data Set Ready always On.

Off if NI Alarm - Data Set Ready turned off during NI alarms.

CTS *Follow RTS* - Clear to Send follows Request to Send.

On - Clear to Send always On.

Off if NI Alarm - Clear to Send turned off during NI alarms.

LSD *On* - Line Signal Detect always On.

Off if NI Alarm - Line Signal Detect turned off during NI alarms.

3.8 Bandwidth Allocation

Use the Bandwidth Allocation menu (Figure 3-7) to assign DS0s to the synchronous channel. The number of DS0s that must be assigned is determined by the speed chosen (see Data Rate parameter).

Contact your carrier to ensure that the DS0s you are using match the ones assigned by the carrier.

1. Use the **[Space Bar]** and **[Backspace]** keys to position the cursor on the desired DS0 #.
2. Press **[CR]** to select:

   Not Used - all ones are sent towards the network.

   Channel 1 - data is passed between the synchronous channel and the assigned DS0s.

Observe the *Bandwidth Status* prompt to confirm bandwidth is allocated correctly.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
  No  Yes
```

The default is *No*. Press **[CR]** or **N** if you do not want to save your changes. If you do want to save the changes, press **Y**.

Screen Path

Main Menu

Bandwidth Allocation

▼

Bandwidth Allocation

```
                    Osicom Technologies
                      ROUTERmate-T1

                  Bandwidth Allocation

              DS0                    DS0
               1  Channel 1           13  Channel 1
               2  Channel 1           14  Channel 1
               3  Channel 1           15  Channel 1
               4  Channel 1           16  Channel 1
               5  Channel 1           17  Channel 1
               6  Channel 1           18  Channel 1
               7  Channel 1           19  Channel 1
               8  Channel 1           20  Channel 1
               9  Channel 1           21  Channel 1
              10  Channel 1           22  Channel 1
              11  Channel 1           23  Channel 1
              12  Channel 1           24  Channel 1

        Bandwidth Status : Bandwidth is allocated correctly

Cursor Down = [Space Bar]                 Scroll Through Options = [CR]
Cursor Up = [Backspace]                                   Exit = [X]
```

Figure 3-7. Bandwidth Allocation Menu

3.9 System Diagnostics Menu

The System Diagnostics Menu (Figure 3-8) lets you perform diagnostics and monitor any alarm condition.

> **NOTE**
> To view the ESF error event summaries, press **[P]** (ESF only).

To start a loopback, send a test pattern, or insert a bit error, follow the key prompts at the bottom of the screen.

1. Position the cursor on the desired option.
2. Press **[CR]** to activate the selection.
3. Press **[CR]** to turn off the test.

3.9.1 Loopback Tests

User Controls and Indicators

For each loop test, there is a Control and an Indicator.

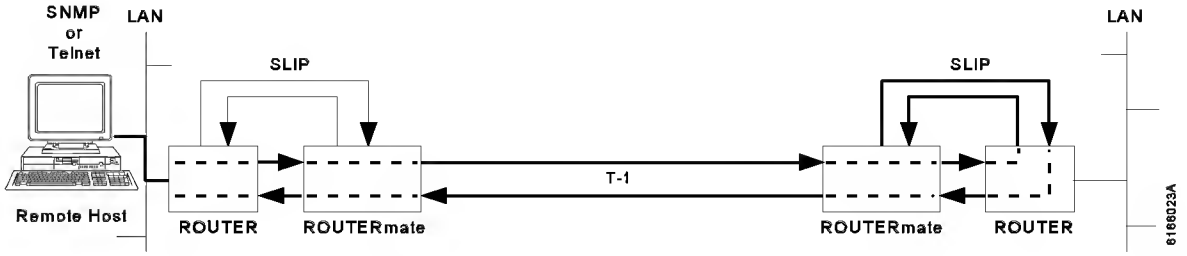
On or *Off* (Control) - indicates whether or not a loop command has been selected.

Yes or *No* (Indicator) - indicates whether or not the unit has responded to the loop command.

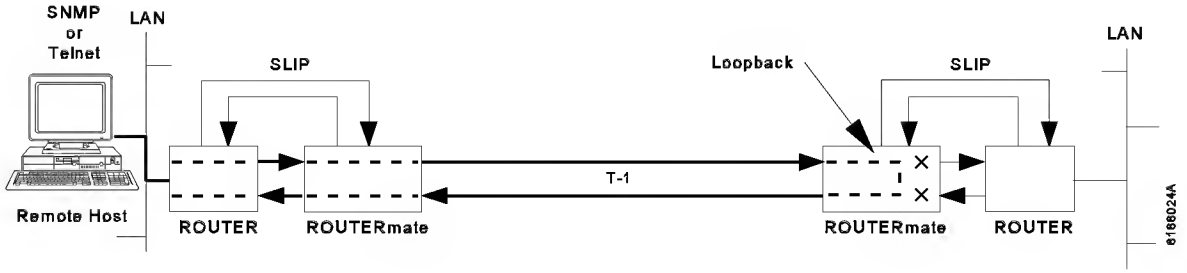
See Figure 3-9 for test pattern generator, loopback, and framer locations.

NOTE

If using SNMP or telnet management, initiating any diagnostic test from a host on a remote network will terminate communication with the unit if the path used to manage the unit is across the line to which the unit is attached. To resume communication in this instance, either turn off the test locally or reset the unit.

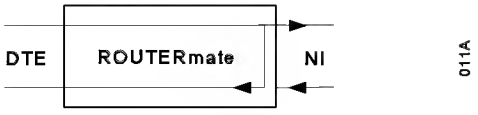


Remote Host SNMP and Telnet Management Path

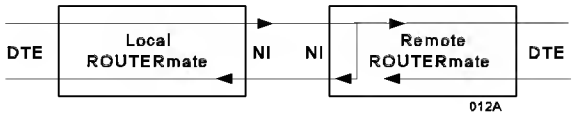


Loopback Interrupts Management Path to Remote Unit

Local NI Loop - tests for proper operation of the CSU. All DS0s are looped back when an NI loopback is set.



Remote NI Loop - Remote NI Loop generates a full-rate inband test pattern toward the network, which puts the remote unit in Line loopback. All DS0s are looped back when a Line loopback is set.



If the Remote NI Loop pattern does not come back, either:

- a remote loopback has not occurred,
- the remote unit is configured not to respond to remote inband loop commands, or
- the local unit can not recognize the pattern.

In this case, the User Controls will display On-No, indicating the local unit cannot recognize the remote unit's loopback state.

The same is true in reverse. That is, if you set the User Control to Off (to turn the test off), but the Indicator still displays Yes, the remote unit could still be in loopback.

Screen Path

Main Menu

System Diagnostics

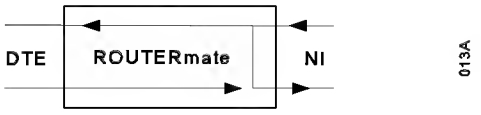
▼

System Diagnostics and Statistics

```
                          Osicom Technologies
                            ROUTERmate-T1

                    System Diagnostics and Statistics

Local NI Loop:    Off-No   Test Pattern:     Off      Seconds in Test:  000000
Remote NI Loop:   Off-No                              Seconds in Error: 000000
Line Loop:        Off-No   Insert Bit Error: Off
Payload Loop:     Off-No                             Last Reset Time:  0


                                    NI
Alarm      Rx       Tx                                        Multi OOF:00000
Red:    No  0000                Out of Frame:    No  0000     BPV:      00000
Blue:   No  0000  No  0000      Loss of Signal:  No  0000     Density:  00000
Yellow: No  0000  No  0000                                    CRC6:     00000




Cursor Down = [Space Bar]        Next Page [P]                Select = [CR]
Cursor Up = [Backspace]           Clear = [C]                    Exit = [X]
```

Figure 3-8. System Diagnostics Menu

Line Loop - transmits back to the network exactly what is received, unchanged.



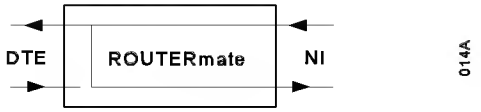
A Line Loop can also be set by a bit pattern sent from the carrier or the remote Routermate T-1, or by a message sent by the carrier on the ESF Data Link.

Off-No - indicates a Line Loopback is *not* set.

Off-Yes - indicates a Line Loopback was set by the carrier or remote Routermate T-1.

On-Yes - indicates a Line Loopback was set locally.

Payload Loop - transmits back to the network what is received on all 24 DS0s, but the signal is reframed. A Payload Loop can also be set by a message sent by the carrier on the ESF Data Link.



Off-No - indicates a Payload Loop is not set.

Off-Yes - indicates a Payload Loop was sent by the carrier.

On-Yes - indicates a Payload Loop was set locally.

Test Pattern - press **[CR]** to toggle through the following available test patterns:

QRSS, Frmd 1's, Min Density, Off

When the test pattern generator is enabled, the test pattern is placed in all 24 DS0s and sent towards the network interface. See Figure 3-9.

The QRSS test pattern will cause density errors if the coding is AMI and the density is AT&T 62411.

Insert Bit Error - insert bit errors. Typically, it is used to verify that the test pattern generator will detect errors.

To insert a bit error, press **[CR]**; *On* will appear, letting you know that the bit error was inserted. After about half a second, the display automatically toggles to *Off*.

Seconds In Test - the length of time the Test Pattern has been enabled.

Seconds In Error - the number of seconds an error was detected in the test pattern.

Last Reset Time - the **[C]**lear command resets all counters on the screen. This parameter indicates the time (HH:MM) since the **[C]**lear command was executed or the unit was reset.

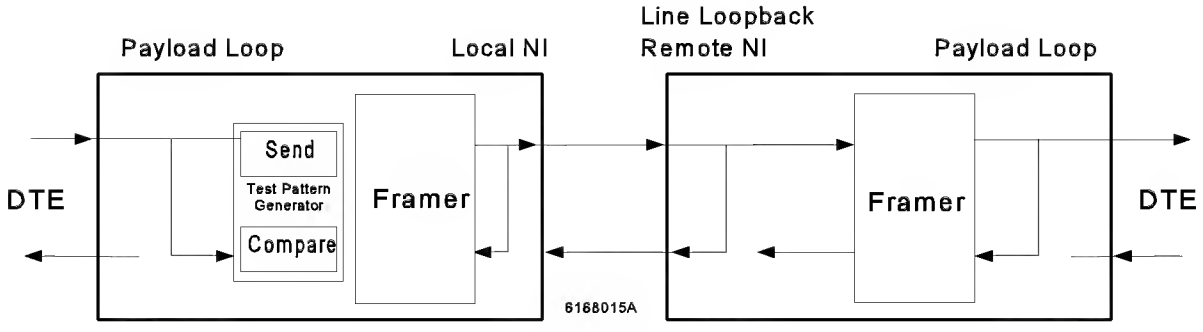


Figure 3-9. Test pattern Generator, Loopback, and Framer Locations

3.9.2 Alarms

There are three alarm conditions: Red, Blue, and Yellow. Each alarm has an indicator and a counter. The indicator (No or Yes) reports if the alarm currently exists. The counter indicates the number of seconds the alarm statistic has existed since the last reset.

The Rx side refers to the receive pair from the carrier and the Tx side refers to the transmit pair to the network. Since alarms can occur on both sides, this screen shows you exactly where the alarm is occurring.

Red - exists when there is a loss of signal or the incoming signal is out of frame for at least 2.5 seconds. In the Red Alarm state, a Yellow Alarm signal is transmitted toward the source of the Red Alarm until the Red Alarm no longer exists.

Blue - exists when an unframed All Ones signal is transmitted or received.

Yellow - in ESF mode, a Yellow Alarm exists when a repeating pattern of eight ones followed by eight zeroes is sent on the data link for a minimum of one second.

In D4 mode, a Yellow Alarm is a condition that occurs when bit two in each DS0 is set to zero. A Yellow Alarm indicates the equipment at the opposite end of the line from the interface receiving the yellow alarm is out-of-frame or out-of-sync on its receive pair (in Red Alarm).

3.9.3 NI Alarm Indicators

The following alarm indicators refer to the signal received from the carrier. Each alarm has an indicator and a counter. The indicator (No or Yes) reports if the alarm currently exists. The counter indicates the number of seconds the alarm statistic has existed since the last reset.

Out of Frame - condition declared when the unit senses errors in the framing pattern. This occurs when any 2 of 4, any 2 of 5, or any 3 of 5 consecutive framing bits received contain bit errors in the framing pattern. OOF condition clears when reframing occurs.

Loss of Signal - condition declared when the unit detects 175 (±75) successive pulse positions with no pulse of either positive or negative polarity.

3.9.4 Error Counters

Error counters display the number of times a particular error event has occurred since the last reset.

Multi OOF - the number of Out of Frame errors. This condition may be declared when the unit senses that more than 1 framing bit in the received Extended Superframe or the received Superframe is in error.

BPV - the number of Bipolar Violations in the signal received from the network. This condition is declared when consecutive pulses are of the same polarity.

Density - the number of Bit Density Errors detected in the data received from the synchronous channel. If NI Coding is *AMI-62411*, the Routermate T-1 will insert ones to ensure that the signal transmitted towards the network meets the minimum density requirements.

CRC6 (ESF Mode) - a Cyclic Redundancy Check (CRC) is performed on each received extended superframe to make sure it agrees with the CRC6 field transmitted by the network. If it is not the same, a CRC error is generated.

CRC6 is not supported in D4 mode.

3.10 System Diagnostics and Statistics Submenu

From the System Diagnostics and Statistics Menu, press **[P]** to access the ESF error events summaries (Figure 3-10).

This screen is an informational display that allows you to see the ESF register summaries, the number of valid intervals, and the number of elapsed seconds in the current interval. ESF Error Event and Unavailable Signal State are also displayed.

The current interval and the 24-hour total summaries are displayed for both the user and carrier registers.

To reset the user register summaries, press [C]lear on the User Registers screen. The carrier registers can only be reset by the carrier.

Press **[P]** to return to the first System Diagnostics and Statistics Menu.

Valid Interval - indicates how many complete 15 minute (900 second) periods have occurred.

Elapsed Seconds - the number of seconds that have passed in the current interval.

ESF Error Event - an ESF that contains either a CRC 6 error, an Out of Frame (OOF), or both.

Unavailable Signal State - a `1' indicates the start of 10 seconds of Severely Errored Seconds. A `0' indicates normal operation.

Errored Seconds - the number of errored seconds that contained one or more ESF error events.

Unavailable Errored Seconds - displayed after ten consecutive Severely Errored Seconds.

Severely Errored Seconds - the number of errored seconds that have at least 320 CRC 6 errors or one or more OOF (Out Of Frame) errors.

Bursty Errored Seconds - the number of errored seconds that have more than one but less than 320 CRC 6 errors.

Loss Of Frame Count - the accumulation of the number of times a Loss of Frame has occurred.

Screen Path

Main Menu

System Diagnostics

▼

System Diagnostics and Statistics

Next Page [P]

```
                    Osicom Technologies
                      ROUTERmate-T1

              System Diagnostics and Statistics

                                User     Carrier
Valid Interval:                 00       00
Elapsed Seconds:                000      000

ESF Error Event:                00000    00000
Unavailable Signal State:       0

                                   Current              24 Hour
                                User     Carrier     User     Carrier
Errored Seconds:                000      000         00000    00000
Unavailable Errored Seconds:    000      000         00000    00000
Severely Errored Seconds:       000      000         00000    00000
Bursty Errored Seconds:         000      000         00000    00000
Loss of Frame Count:            00       00          000      000

 Previous Page = [P]                                        Exit = [X]
```

Figure 3-10. Statistics and Alarms Submenu

3.11 Channel Diagnostics Menu

The Channel Diagnostics Menu (Figure 3-11) lets you monitor the present conditions of a channel and perform diagnostics on that channel.

IMPORTANT

If using SNMP or telnet management, initiating any diagnostic test from a host on a remote network will terminate communication with the unit if the path used to manage the unit is across the line to which the unit is attached.

To resume communication in this instance, either turn off the test locally or reset the unit.

3.11.1 Diagnostic Tests

For each loop test, there is a Control and an Indicator.

On or *Off* (Control) - indicates whether or not a loop command has been selected.

Yes or *No* (Indicator) - indicates whether or not the unit has responded to the loop command.

Figure 3-12 illustrates the test pattern generator and channel loopbacks.

Local Loop - a bi-directional loop that is used to verify that the synchronous channel is operating properly.

Remote Loop - sends a V.54 pattern to the remote unit, which puts the synchronous channel in local loop.

Test Pattern - initiates the channel test pattern generator. Enabling this option causes a 511 test pattern to be sent towards the remote unit. The channel test pattern generator is in front of the local channel loop, therefore the test pattern will not be looped if only a local channel loopback is set.

Press **[CR]** to toggle the test pattern On (511) or Off.

Seconds In Test - the length of time the channel test pattern has been enabled.

Seconds In Error - the number of seconds during which an error was detected in the channel test pattern.

Screen Path

Main Menu

Channel Diagnostics

▼

Channel Diagnostics

```
                    Osicom Technologies
                       ROUTERmate-T1

                   Channel Diagnostics

                                  Channel 1

            Local Loop:           Off-No
            Remote Loop:          Off-No
            Test Pattern:         511

            Seconds in Test:      000000
            Seconds in Error:     000000

            DSR:                  Off
            CTS:                  Off
            LSD:                  Off
            DTR:                  Off
            RTS:                  Off


Cursor Down = [Space Bar]                              Select = [CR]
Cursor Up = [Backspace]          Clear = [C]             Exit = [X]
```

Figure 3-11. Channel Diagnostics Menu

3.11.2 Status

The state of the control leads on the synchronous channel interface is described below.

DSR - indicates Data Set Ready On or Off from the channel.

CTS - indicates Clear To Send On or Off from the channel.

LSD - indicates Line Signal Detect On or Off from the channel.

DTR - indicates Data Terminal Ready On or Off to the channel.

RTS - indicates Request To Send On or Off to the channel.

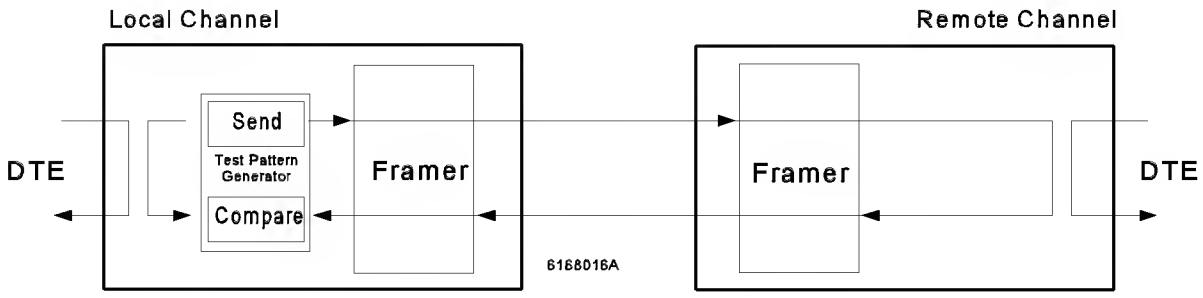


Figure 3-12. Test Pattern Generator and Channel Loopbacks

3.12 User Registers

The User Registers Menu (Figure 3-13) is an informational display (ESF only) that allows you to view the status of the ESF link over a 24-hour period in 15 minute intervals. The menu displays a summary of the error events as discussed in the System Diagnostics and Statistics submenu. Interval 01 is the most current interval.

1. Press **[P]** to view registers 49 to 96.
2. Clear the registers by pressing **[C]**.

Clearing the counters on this screen resets all 96 intervals and also clears the statistics from the Current and 24 Hour columns in the System Diagnostics and Statistics submenu.

Screen Path

Main Menu

User Registers

▼

User Registers

```
                          Osicom Technologies
                             ROUTERmate-T1

                             User Registers

Int ES  UAS SES BES LOFC   Int ES  UAS SES BES LOFC   Int ES  UAS SES BES LOFC
01. --- --- --- --- ---    17. --- --- --- --- ---    33. --- --- --- --- ---
02. --- --- --- --- ---    18. --- --- --- --- ---    34. --- --- --- --- ---
03. --- --- --- --- ---    19. --- --- --- --- ---    35. --- --- --- --- ---
04. --- --- --- --- ---    20. --- --- --- --- ---    36. --- --- --- --- ---
05. --- --- --- --- ---    21. --- --- --- --- ---    37. --- --- --- --- ---
06. --- --- --- --- ---    22. --- --- --- --- ---    38. --- --- --- --- ---
07. --- --- --- --- ---    23. --- --- --- --- ---    39. --- --- --- --- ---
08. --- --- --- --- ---    24. --- --- --- --- ---    40. --- --- --- --- ---
09. --- --- --- --- ---    25. --- --- --- --- ---    41. --- --- --- --- ---
10. --- --- --- --- ---    26. --- --- --- --- ---    42. --- --- --- --- ---
11. --- --- --- --- ---    27. --- --- --- --- ---    43. --- --- --- --- ---
12. --- --- --- --- ---    28. --- --- --- --- ---    44. --- --- --- --- ---
13. --- --- --- --- ---    29. --- --- --- --- ---    45. --- --- --- --- ---
14. --- --- --- --- ---    30. --- --- --- --- ---    46. --- --- --- --- ---
15. --- --- --- --- ---    31. --- --- --- --- ---    47. --- --- --- --- ---
16. --- --- --- --- ---    32. --- --- --- --- ---    48. --- --- --- --- ---

Next Page = [P]                  Clear = [C]                       Exit = [X]
```

Figure 3-13. Local User Registers Menu

3.13 Carrier Registers

The Carrier Registers menu (Figure 3-14) is an informational display (ESF only) that allows you to view the status of the ESF link over a 24-hour period. This is the same information that would be sent to the carrier (Telco) if requested. The menu displays a summary of the error events as discussed in the System Diagnostics and Statistics submenu. Interval 01 is the most current interval.

Press **[P]** to view registers 49 to 96.

> **NOTE**
> The values in the registers on the carrier screens are cleared only by Telco.

Screen Path

Main Menu

Carrier Registers

▼

Carrier Registers

```
                          Osicom Technologies
                             ROUTERmate-T1

                           Carrier Registers

Int ES  UAS SES BES LOFC   Int ES  UAS SES BES LOFC   Int ES  UAS SES BES LOFC
01. --- --- --- --- ---    17. --- --- --- --- ---    33. --- --- --- --- ---
02. --- --- --- --- ---    18. --- --- --- --- ---    34. --- --- --- --- ---
03. --- --- --- --- ---    19. --- --- --- --- ---    35. --- --- --- --- ---
04. --- --- --- --- ---    20. --- --- --- --- ---    36. --- --- --- --- ---
05. --- --- --- --- ---    21. --- --- --- --- ---    37. --- --- --- --- ---
06. --- --- --- --- ---    22. --- --- --- --- ---    38. --- --- --- --- ---
07. --- --- --- --- ---    23. --- --- --- --- ---    39. --- --- --- --- ---
08. --- --- --- --- ---    24. --- --- --- --- ---    40. --- --- --- --- ---
09. --- --- --- --- ---    25. --- --- --- --- ---    41. --- --- --- --- ---
10. --- --- --- --- ---    26. --- --- --- --- ---    42. --- --- --- --- ---
11. --- --- --- --- ---    27. --- --- --- --- ---    43. --- --- --- --- ---
12. --- --- --- --- ---    28. --- --- --- --- ---    44. --- --- --- --- ---
13. --- --- --- --- ---    29. --- --- --- --- ---    45. --- --- --- --- ---
14. --- --- --- --- ---    30. --- --- --- --- ---    46. --- --- --- --- ---
15. --- --- --- --- ---    31. --- --- --- --- ---    47. --- --- --- --- ---
16. --- --- --- --- ---    32. --- --- --- --- ---    48. --- --- --- --- ---

Next Page = [P]                                                  Exit = [X]
```

Figure 3-14. Local Carrier Registers Menu

3.14 Unit Menu

The Unit Menu (Figure 3-15) contains supervisory and unit control information.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
 No  Yes
```

The default is *No*. Press **[CR]** or **N** if you do not want to save your changes. If you do want to save the changes, press **Y**.

Header Line 1 - lets you replace or modify the header appearing at the top of each menu. To do so:

1. Place the cursor at the Header Line 1 field and press **[CR]**; the cursor automatically positions itself at the header on the top of the menu.
2. Enter the new header, followed by a **[CR]**.

   The new header is displayed after you confirm the configuration and exit the screen.

Header Line 2 - lets you replace or modify the header appearing on line 2. Set this option the same way as instructed for Header 1.

Inactivity Timeout - specifies the time that elapses before the console is deactivated, or the Telnet connection is disconnected. If there is no keyboard activity during the specified time, the console is deactivated and access is restricted to users who enter the password. This security feature reduces the opportunity for unauthorized access to the management screens.

Position the cursor on the field and press **[CR]**; type the hours and minutes in *hh:mm* format. You do not need to type the colon.

The maximum time is *23:59*. Set the time to *00:00* to disable this feature.

Screen Path

Main Menu

Unit

▼

Unit

```
                        Osicom Technologies
                          ROUTERmate-T1

                                Unit


        Header Line 1:          Osicom Technologies
        Header Line 2:          ROUTERmate T1 CSU/DSU
        Inactivity Timeout:     00:05 (hh:mm)
        Password:               ********
        System Restart:         >>
        Service Information:    >>


        Firmware Revision:      2.0.00




Cursor Down = [Space Bar]                          Edit Field = [CR]
Cursor Up = [Backspace]                                  Exit = [X]
```

Figure 3-15. Unit Menu

Password - set your own password. A password can consist of eight characters or less. Once the password is set, the Logoff function in the Main Menu prevents unauthorized access to the menus.

To set the password:

1. At the Password field, press **[CR]**]. The cursor automatically positions itself to the right of the Password field and the following prompt will appear on the screen:

   Enter a password

2. Enter a password. The password will appear on the screen as it is typed.
3. Press **[CR]** to submit the password. The password changes to asterisks and the prompt disappears.

Firmware Revision - identifies the revision level of the firmware installed in the unit.

3.14.1 System Restart

The System Restart menu (Figure 3-16) supports two types of restarts.

Software Restart - equivalent to powering the Routermate T-1 off and on. Configuration parameters are not affected.

Defaults Restart - change configuration parameters on all menus to their default values.

> **NOTE**
>
> If Defaults Restart is selected, an active Telnet session will be closed. You must re-enter the IP address from a local terminal before you can make another Telnet connection.

Screen Path

Main Menu

Unit

▼

Unit

System Restart

▼

System Restart

```
                    Osicom Technologies
                       ROUTERmate-T1


                      System Restart

                  .--------------------.
                  |Select Restart Type |
                  |--------------------|
                  | Cancel Restart     |
                  | Software Restart   |
                  | Defaults Restart   |
                  `--------------------'




Cursor Down = [Space Bar]                          Select = [CR]
Cursor Up = [Backspace]                               Exit = [X]
```

Figure 3-16. System Restart Menu

3.14.2 Service Information

Select Service Information to display telephone, fax, e-mail, and web site numbers for contacting service personnel.

Screen Path

Main Menu

Unit

▼

Unit

Service Information

▼

Service Information

```
Osicom Technologies
   ROUTERmate-T1

Service Information

Osicom Technologies, Inc.
9020 Junction Drive
Annapolis Junction, MD 20701
Tel:      800-359-2273
Fax:      301-317-7220
E-Mail:   support@osicom.com
WWW:      www.osicom.com

                                    Unit Screen = [X]
```

Figure 3-17. Service Information Screen

3.15 Management Menu

The Management configuration screen (Figure 3-18) is used to configure management parameters for SNMP and Telnet operation.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
  No  Yes
```

The default is *No*. Press **[CR]** or **N** if you do not want to save your changes. If you do want to save the changes, press **Y**.

Select **Trap Client Table** to display the SNMP Trap Client Table screen.

Internet Address - the IP (Internet Protocol) address that is assigned to the Routermate T-1. Position the cursor on the field and press **[CR]**. Enter a decimal value and press **[CR]** again.

> **NOTE**
> You must assign a unique IP address to the Routermate's SLIP interface to allow SNMP or Telnet management.

Subnet Mask - a subnet mask is not required for the Routermate T-1 to operate. It is suggested, however, you enter the same subnet mask as the router or terminal server to which the Routermate is attached.

Access via telnet - provides a security feature; if disabled, Telnet access of management screens is prevented.

Select:

Enabled - telnet access is permitted.
Disabled - telnet access is prevented.

SNMP R/O Community - the community string used for read-only access to the Routermate T-1's MIB objects. Position the cursor on the field and press **[CR]**; type the string and press **[CR]** again.

SNMP R/W Community - the community string used for read-write access to the Routermate T-1's MIB objects. If this is set to the same value as the read-only string, write access is prevented. Position the cursor on the field and press **[CR]**; type the string and press **[CR]** again.

SNMP community strings are not included in the enterprise MIB; this is to prevent a user with read-only privileges from viewing the community strings.

Authentication Traps - enable/disable authentication traps sent by the router when an SNMP request is received with an invalid community string. A trap is an unsolicited alarm or event.

Enabled - allows alarm messages.

Disabled - prevents alarm messages.

Enterprise Traps - an enterprise trap, or alarm (ie.: NI Red Alarm) is unsolicited information from an agent to the management station. Traps are the only type of unsolicited data that is permitted with SNMP. They occur only when a threshold within the agent is violated or when a major event occurs.

Enabled - enterprise-specific traps are sent to the management station.

Disabled - enterprise-specific traps are not sent to the management station.

Auto Learn Clients - for SNMP, determines whether the Routermate T-1 automatically learns the IP addresses of SNMP management stations (clients) to whom SNMP traps are to be sent.

The settings are:

Enabled - the Routermate T-1 learns the IP addresses of SNMP management stations from incoming messages and stores the addresses in the Routermate T-1's client address table. When events occur, traps are sent to each address in the client address table.

The IP addresses of up to 16 SNMP management stations can be learned automatically. The Routermate T-1 learns, on an ongoing basis, the IP addresses of the 16 most recent management stations to access the Routermate T-1.

Disabled - the Routermate T-1 does not learn the IP addresses of SNMP management stations. Traps are sent only to the IP addresses of any SNMP Trap Clients that are manually entered.

SLIP Max Trans Unit - the MTU (Maximum Transmission Unit) for the SNMP LINK interface. This length does not include the IP header, which is usually 20 bytes. The options are:

296, *576*, *1492*, and *1500*

Frames longer than the maximum packet size will be fragmented before transmission.

Screen Path

Main Menu

Management

▼

Management

```
                    Osicom Technologies
                       ROUTERmate-T1


                          Management


          Internet Address:        0.0.0.0
          Subnet Mask:             0.0.0.0

          Access via telnet:       Enabled
          SNMP R/O Community:      public
          SNMP R/W Community:      private
          Authentication Traps:    Enabled
          Enterprise Traps:        Enabled
          Auto Learn Clients:      Enabled
          SLIP Max Trans Unit:     296

          SNMP Trap Client Table:  >>


Cursor Down = [Space Bar]                          Edit Field = [CR]
Cursor Up = [Backspace]                                   Exit = [X]
```

Figure 3-18. Management Menu

3.16 SNMP Trap Client Table

Select SNMP Trap Client Table at the Management screen to display the SNMP Trap Client Table (Figure 3-19).

To configure an address:

1. Position the cursor on an address field in the **Client Address** column and press **[CR]**.
2. Type the address using decimal numbers and separating each address segment with a decimal point.
3. Press **[CR]** to exit the field.

If you have made any changes to this menu, when you press **X** to exit, a confirmation box appears:

```
Confirm this configuration?
No  Yes
```

The default is *No.* Press **[CR]** or **N** if you do not want to save your changes. If you do want to save the changes, press **Y**.

A trap, which is the SNMP term for an alarm or event, is unsolicited information from an SNMP agent to an SNMP management station. Traps are the only type of unsolicited data that is permitted with SNMP. A trap occurs only when a threshold within the agent is violated or when a major event occurs.

Table 3-2, on the following page, lists the enterprise-specific traps provided in the Routermate T-1 MIB.

In addition to the enterprise-specific traps, the following MIB-II traps also are reported:

Link Up (refers to the NI interface)
Link Down (refers to the NI interface)
Warm start
Cold start
Authentication

A trap client is an SNMP management station to which SNMP traps are routed. A trap client is identified by configuring an IP address for each of up to sixteen SNMP management stations.

Client Address - the IP address for the SNMP management station to which SNMP traps are to be sent.

IP addresses are 32-bit numbers that are configured in 4-position, dotted decimal notation. To configure an address, move the cursor to an address field in the **Client Address** column and press **[CR]**. Type the address using decimal numbers and separating each address segment with a decimal point. Press **[CR]** to exit the field.

Type - identifies a trap client as one of the following:

Dynamic - the IP address for this trap client was learned automatically from an incoming SNMP message.

Static - the IP address for this trap client was configured manually.

- - - - - - - no address is assigned.

IP addresses for trap clients can be configured manually, or automatically learned.

For automatic address learning, see **Auto Learn Clients** on page 3-25. Any addresses that are not entered manually can be learned automatically.

If it is desirable to limit the management stations to which traps are sent, the IP addresses for those management stations can be configured manually and the **Auto Learn Clients** feature disabled. In this case, only those management stations whose IP addresses have been configured manually will receive traps from the Routermate T-1.

Table 3-2. Enterprise Traps

TRAP	DESCRIPTION
NI BlueTXOn	NI blue transmit alarm on
NI BlueTXOff	NI blue transmit alarm off
NI BlueRXOn	NI blue receive alarm on
NI BlueRXOff	NI blue receive alarm off
NI YelTXOn	NI yellow transmit alarm on
NI YelTXOff	NI yellow transmit alarm off
NI YelRXOn	NI yellow receive alarm on
NI YelRXOff	NI yellow receive alarm off
NI RedRXOff	NI red receive alarm off
NI RedRXOn	NI red receive alarm on

Screen Path

Main Menu

Management

▼

Management

SNMP Trap Client Table

▼

SNMP Trap Client Table

```
                        Osicom Technologies
                           ROUTERmate-T1


                      SNMP Trap Client Table

     Client Address       Type              Client Address       Type
 1.  36.0.0.2             Static         9.  0.0.0.0             ------
 2.  125.160.160.160      Dynamic       10.  0.0.0.0             ------
 3.  0.0.0.0              ------        11.  0.0.0.0             ------
 4.  0.0.0.0              ------        12.  0.0.0.0             ------
 5.  0.0.0.0              ------        13.  0.0.0.0             ------
 6.  0.0.0.0              ------        14.  0.0.0.0             ------
 7.  0.0.0.0              ------        15.  0.0.0.0             ------
 8.  0.0.0.0              ------        16.  0.0.0.0             ------

                      .-----------------------------.
                      | Confirm this configuration? |
                      |  No    Yes                  |
                      `-----------------------------'

Cursor Down = [Space Bar]                                Select = [CR]
Cursor Up = [Backspace]                                     Exit = [X]
```

Figure 3-19. SNMP Trap Client Table

MAINTENANCE AND REPAIR 4

4.1 Customer Support

Osicom Technologies offers a comprehensive range of customer support services, including technical assistance and maintenance agreements.

For technical assistance or detailed information about Osicom's support plans or pricing, call 1-800-DLX-CARE (1-800-359-2273) to reach a Customer Service Marketing Representative.

The Service Information screen shown in Chapter 3 also provides fax and web site numbers.

4.1.1 Canadian Customers

For technical assistance and service in Canada, contact the following authorized service center:

Novadyne Computer Systems, Inc.
97 Saramia Crescent, Unit 2
Concord (Toronto), Ontario L4K 4P7
Phone: 800-678-3399

4.2 Equipment Return and Repair

Corrective maintenance is limited to the testing and troubleshooting procedures provided in this manual. If, after contacting Customer Support, you are unable to correct any malfunction, please return the unit to Osicom Technologies for repair.

Prior to shipping the unit to Osicom Technologies for repair, call Product Repair at 301-317-7400 and request a Return Goods Authorization (RGA) number.

You may furnish information on defective units to Osicom Technologies by telephone. Please provide the following information:

- Unit part number and serial number
- Brief description of failure symptoms and cause
- Return shipping address (including sender's name)
- Preference of return shipping mode
- Invoice address
- Purchase Order number or letter of authorization for out of warranty units
- Person to contact for further information. Please include telephone number.

For the best equipment protection, use the original cartons and packaging material. Send the unit to:

Osicom Technologies, Inc.
9020 Junction Drive
Annapolis Junction, Maryland 20701

IMPORTANT
RGA number must appear on container!

Table A-1. Console Interface

PIN	SIGNAL	DIRECTION
2	Transmit Data	In
3	Receive Data	Out
5	Clear to Send	Out
6	Data Set Ready	Out
7	Signal Ground	—
8	Carrier Detect	Out

Table A-2.
SLIP Interface, Configured as DTE
(Connects to DCE)

PIN	SIGNAL	DIRECTION
2	Transmit Data	Out
3	Receive Data	In
4	Request to Send	Out
7	Signal Ground	–
20	Data Terminal Ready	Out

Table A-3.
SLIP Interface, Configured as DCE
(Connects to DTE)

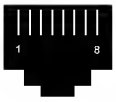
PIN	SIGNAL	DIRECTION
2	Transmit Data	In
3	Receive Data	Out
5	Clear to Send	Out
6	Data Set Ready	Out
7	Signal Ground	–
8	Carrier Detect	Out

NOTE

The default configuration for the SLIP port is DTE. Jumper settings are discussed in *SLIP Management*, page 2-6.

Table A-4. NI Interface

PIN	SIGNAL	DIRECTION
1	Receive	In
2	Receive	In
3	Not used	—
4	Transmit	Out
5	Transmit	Out
6	Not used	—
7	Ground	—
8	Ground	—



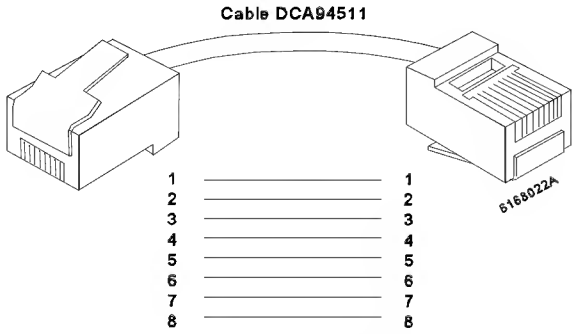
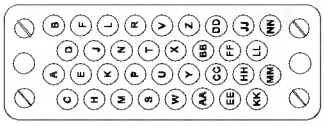


Figure A-1. NI Cable; Straight-thru, Shielded (DCA94511)

Table A-5. V.35 Interface

PIN	SIGNAL	DIRECTION
E	Data Set Ready	Out
D	Clear to Send	Out
R	Receive Data (A)	Out
T	Receive Data (B)	Out
P	Transmit Data (A)	In
S	Transmit Data (B)	In
C	Request to Send	In
H	Data Terminal Ready	In
F	Data Carrier Detect	Out
B	Signal Ground	—
Y	Transmit Clock (A)	Out
AA	Transmit Clock (B)	Out
V	Receive Clock (A)	Out
X	Receive Clock (B)	Out
U	Ext Transmit Clock (A)	In
W	Ext Transmit Clock (B)	In



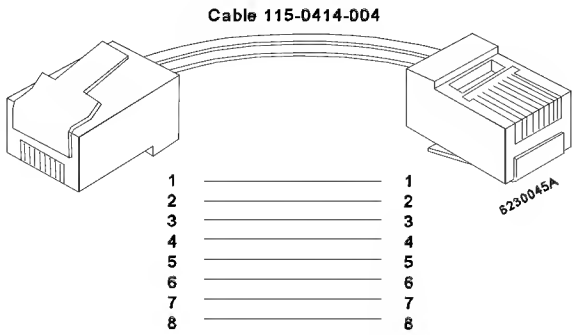


Figure A-2. Cable, Straight-thru (115-0414-004)

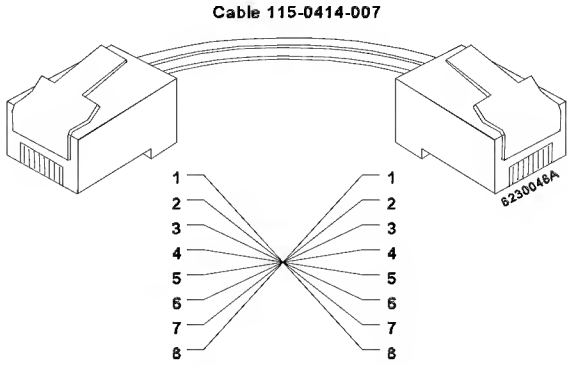


Figure A-3. Cable, Crossover (115-0414-007)

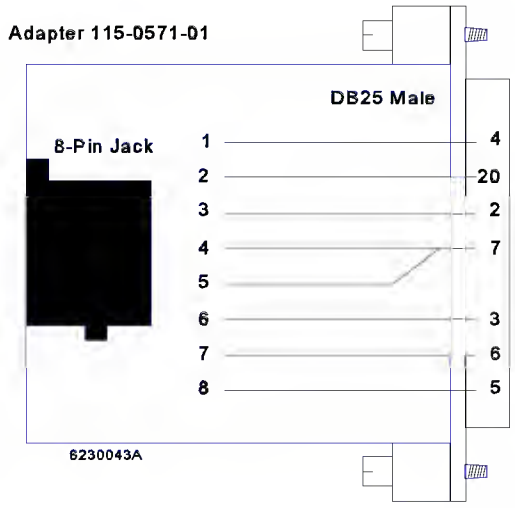


Figure A-4. Adapter, 8-pin Jack to DB25 Male (115-0571-01)

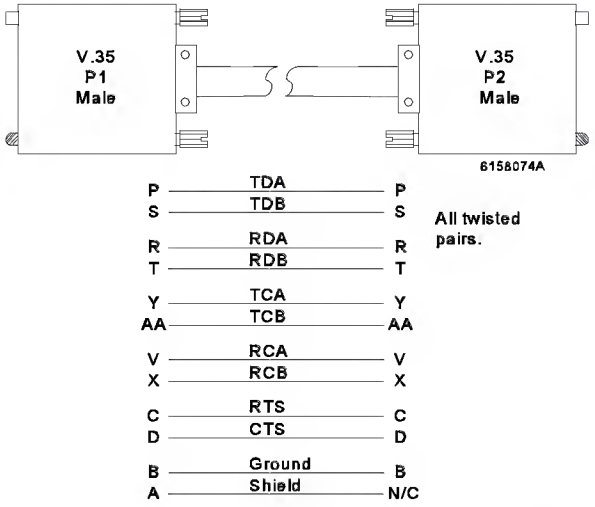


Figure A-5. Cable, V.35 Extension; Male-to-Male, Shielded (115-0537-01)

> ***NOTE***
>
> Appendix B lists order numbers for these cables.

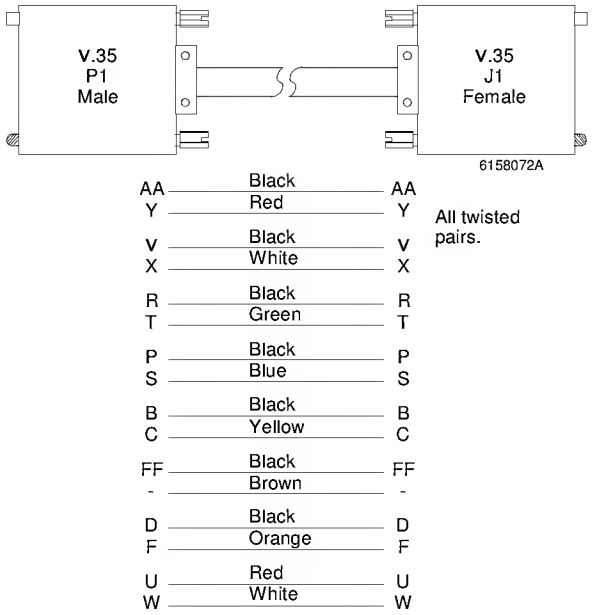


Figure A-6. Cable, V.35 Extension; Male-to-Female, Shielded (905-7177-XX)

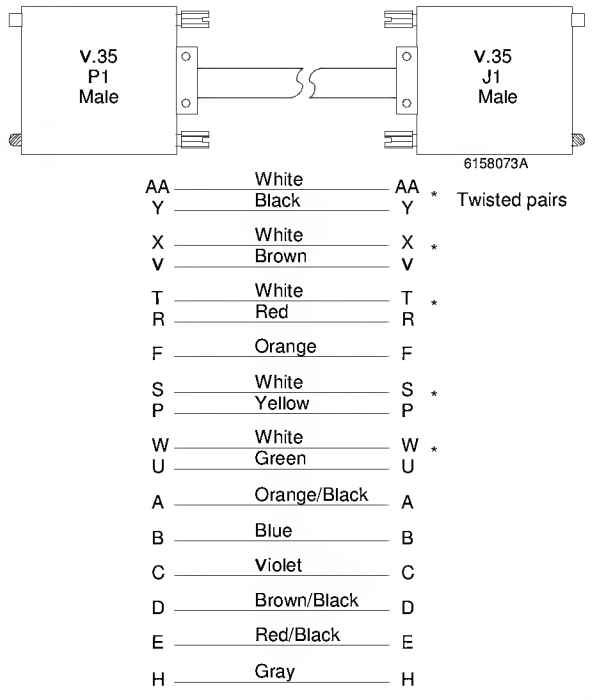


Figure A-7. Cable, V.35 Extension; Male-to-Male, Shielded (DCA9A51A/CBE9051X)

ORDERING INFORMATION APPENDIX B

Table B-1. Routermate Ordering Information	
DESCRIPTION	ORDER NUMBER
ROUTERmate T1 CSU/DSU (includes power transformer and network cable)	Routermate-T1
Manual Routermate T1 CSU/DSU Installation and Operation	918-6168
Power Transformer	550-0366-01
Management Enterprise MIB written in standard ASN.1 notation	Free download from Osicom's web site at: http://www.osicom.com

Table B-2. Cable and Adapter Ordering Information		
DESCRIPTION	PART NUMBER	ORDER NUMBER
NI cable; straight-thru, shielded (see Figure A-1)	DCA94511	CBE9451 (15 feet)
Cable; straight-thru (see Figure A-2)	115-0414-004	CBE04144 (7 ft)
Cable; crossover (see Figure A-3)	115-0414-007	CBE04147 (6 ft)
Adapter; 8-pin jack to DB25 male (see Figure A-4)	115-0571-01	CBE73001
V.35; Male-to-Male, shielded (see Figure A-5)	115-0537-01	CBE05371 (18 in)
V.35 Extension; Male-to-Female, shielded (see Figure A-6)	905-7177-01 905-7177-02 905-7177-03 905-7177-04 905-7177-05	CBE71771 (10 ft) CBE71772 (25 ft) CBE71773 (50 ft) CBE71774 (2 ft) CBE71775 (5 ft)
V.35 Extension; Male-to-Male, shielded (see Figure A-7)	DCA9A51A CBE90511 CBE90512 CBE90513 CBE90514	CBE9051 (15 ft) CBE90511 (25 ft) CBE90512 (50 ft) CBE90513 (75 ft) CBE90514 (100 ft)

Table C-1. Routermate T-1 CSU/DSU Specifications	
ITEM	SPECIFICATION
Network Interface	
Rate	1.544 Mbps ± 50 bps
Format	AMI or B8ZS
Output Signal	DSX-1 w/LBO
Input Signal	DSX-1 to -29 dB DSX
Framing	SF or ESF
Jitter Tolerance	Per AT&T Pub 62411
Termination	RJ48C 8-pin modular jack
V.35 Synchronous Interface	
Rate	Any multiple of 56 or 64 Kbps up to 1.536 Mbps
Termination	Electrical: CCITT V.35; Mechanical: 34 pin female
SLIP Port	Configured for SNMP and async Telnet
Interface	RS-232, 25-pin female
Speed	9600 bps
Console	
Interface	RS-232, 25-pin female
Speed	9600 bps
Timing	Internal, External, Repeater
LDM Mode	Will drive up to 6000 feet
LED Indicators	ALM, TST, PWR
Power	120 ±10% VAC, 57 to 63 Hz, 5 watts
Dimensions	9.6 inches deep x 6.25 inches wide x 1.6 inches high
Weight	2 pounds
Temperature	
Operating	32° to 122° F, 0° to 50° C
Storage	–40° to 158° F, –40° to 70° C
Relative Humidity	0% to 95%, non-condensing
UL Compliance	Meets UL 1459 requirements
Industry Canada's Compliance	This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

The multipurpose label for the Routermate is found on the underside of the unit. It is illustrated here for reference.

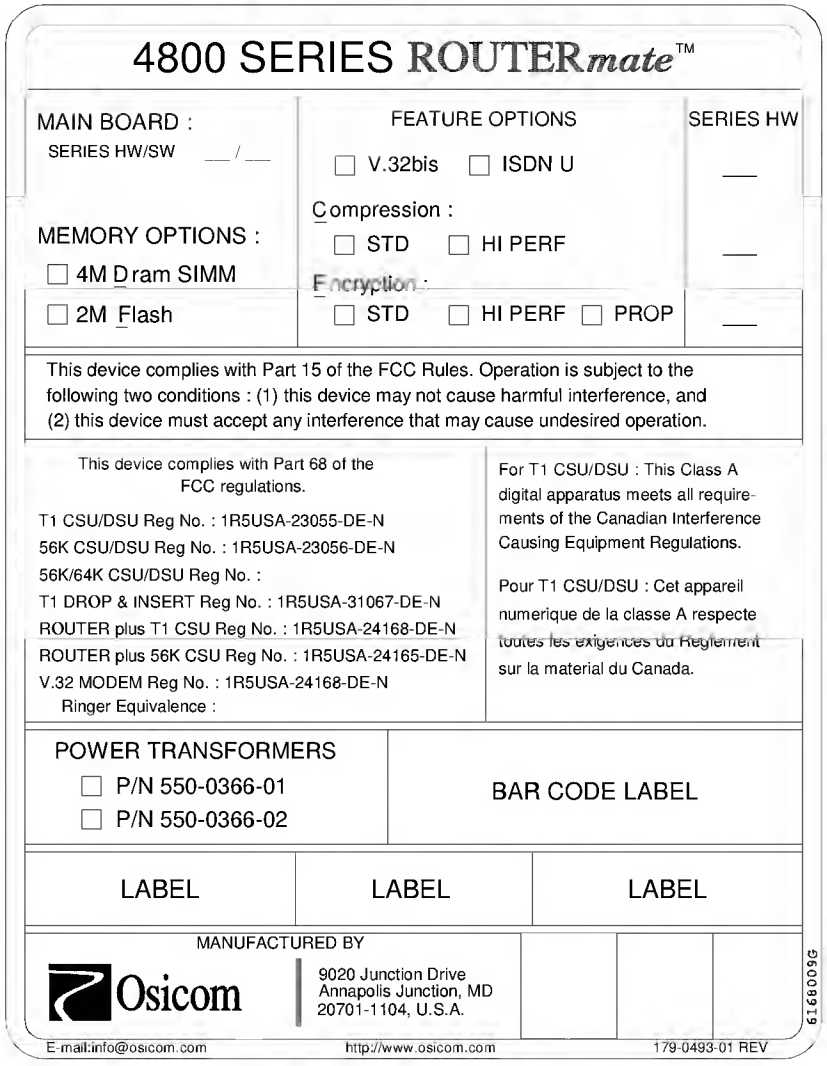


Figure D-1. Multipurpose Label - Routermate

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